

## C L A I M S

1. A method of manufacturing a gas diffusion electrode, the method comprising:
  - 5 (a) agglomerating a powder mixture with PTFE particles in a dry form to produce a dry an agglomerate;
  - (b) adding an organic solvent to the dry agglomerate to produce a paste;
  - (c) calendering the paste into a thin sheet with a thickness less than 1mm, to form an active layer or gas diffusion layer, one or both of said layers containing a current collector; and
  - 10 (d) combining said active layer and said gas diffusion layer to form a gas diffusion electrode.
2. A method according to claim 1,  
15 c h a r a c t e r i z e d i n that agglomeration is carried out using a ball mill for mixing.
3. A method according to claim 2,  
c h a r a c t e r i z e d i n that the powders are mixed for more than 30 minutes.  
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4. A method according to claim 1,  
c h a r a c t e r i z e d i n that agglomeration is carried out using a blender with blades rotating at 1000-3000 rpm.
- 25 5. A method according to claim 4,  
c h a r a c t e r i z e d i n that the powders are heated to a temperature in the range of 50-200°C prior to step (a).
6. A method according to claim 4,  
30 c h a r a c t e r i z e d i n that an agglomeration time of at least 1 minute is used.
7. A method according to claim 1,  
c h a r a c t e r i z e d i n that agglomeration is carried out using a high-speed mill with rotating blades which rotate at more than 10000 rpm.

8. A method according to claim 7,  
characterized in that the agglomeration time is from 10 seconds to  
5 minutes.
- 5 9. A method according to any of claims 1 to 8,  
characterized in that the solvent is slowly added to the agglomerate with  
stirring.
- 10 10. A method according to claim 9,  
characterized in that the agglomerate is heated during stirring.
11. A method according to any of claims 1 to 10,  
characterized in that the paste is extruded into a thin film prior to  
15 calendering.
12. A method according to any of claims 1 to 11,  
characterized in that a current collector or mechanical support is calend-  
ered into said film.
- 20 13. A method according to any of claims 1 to 12,  
characterized in that the powder mixture forming the active layer is  
100 wt% graphite.
- 25 14. A method according to any of claims 1 to 12,  
characterized in that the powder mixture forming the active layer compri-  
ses 25-75 wt% graphite with platinum, and 25-75 wt% graphite.
15. A method according to any of claims 1 to 12,  
30 characterized in that the powder mixture forming the active layer compri-  
ses 25-75 wt% graphite with Ag, Co, Fe, perovskites or spinells, and 25-75 wt%  
graphite.

16. A method according to any of claims 1 to 15,  
characterized in that PTFE with a particle size less than 1mm is added  
to the mixture before agglomeration step (a).
- 5 17. A method according to any of claims 1 to 16,  
characterized in that the powder mixture comprises 55-75 wt% activated  
carbon or graphite and 25-45 wt% PTFE.
- 10 18. A method according to any of claims 1 to 17, comprising a further calender-  
ing step wherein said electrode is calendered with a further gas diffusion layer  
made according to the method described in steps (a)-(d).
- 15 19. A method according to any of claims 1 to 18,  
characterized in that said layers are combined in step (d) by calendering  
or pressing.
- 20 20. A method according to any of claims 1 to 19,  
characterized in that said electrode is dried at a temperature less than  
40°C.
21. A method according to any of claims 1 to 20,  
characterized in that said steps (a)-(d) are performed in a continuous  
production line.
- 25 22. A method according to any of claims 1 to 21,  
characterized in that said gas diffusion layer and said active layer are  
produced in parallel continuous production lines and said production lines are  
combined in the combining step (d).
- 30 23. An electrode manufactured by a method according to any of claims 1-22.
24. A gas diffusion electrode comprising a gas diffusion layer and an active  
layer, the gas diffusion layer comprising 55-75 wt% activated carbon or graphite  
and 25-45 wt% PTFE and the active layer comprising 25-75 wt% activated carbon

or graphite with noble or non-noble metal catalyst and 25-75 wt% activated carbon or graphite with high surface area ( $>100 \text{ m}^2/\text{g}$ ) and 5-20 wt% PTFE, the gas diffusion layer and the active layer being manufactured according to the method in any of claims 1 to 22.

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25. Use of the gas diffusion electrode according to claim 23 or 24 in fuel cells, metal-air batteries or membranes.